

SKIBAR, Karel, inz.

"Mechanization and automation of fitting and assembly works"
by B.F. Fedorov. Reviewed by Karel Skibar. Stroj vyr 11 no.7:
372 '63.

SKIBAR, Karel, inz.

"Mechanization and automation of universal metal-working lathes"
by A.N. Malov. Reviewed by Karel Skibar. Strojirenstvi 13
no.4:217 '63.

SKIBAR, K., inz.

Saving materials by appropriate design of machines. Strojirenstvi
13 no. 5:375-386 My '63.

1. Vyzkumny ustav obrabecich stroju a obrabeni, Praha.

SKIBAR, Marija, inz.

Preparation of p-toluene and m-xylene sulfonic acids. Kemija
u industriji 11 no. 6:336-337 Je '62.

l. "Kutrilin", Zagreb.

L 27489-66 FBD/EWT(1)/EWT(4)/EEC(k)-2/T/EWP(t)/EWP(k)/EWA(h) IJP(c) WG/JD
ACC NR: AP6015437 SOURCE CODE: UR/0051/66/020/005/0908/0910

AUTHOR: Skibarko, A. P.; Prichko, Yu. V.

ORG: none

TITLE: Measurement of the gain of coherent optical radiation in a tube containing a helium-neon mixture

SOURCE: Optika i spektroskopiya, v. 20, no. 5, 1966, 908-910

TOPIC TAGS: laser, gas laser, helium, neon, noble gas, laser emission

coherence

ABSTRACT: An experimental arrangement for direct measurement of the gain per pass G of an He-Ne laser in which there is no feedback is described. The method was used to measure the G of a tube (110 cm long, 8 mm in diameter) filled with He-Ne exposed to a beam from another He-Ne laser. It was shown that the average pump power cannot be used as the criterion for establishing the identity of both the modulated and the unmodulated operating regimes. Orig. art. has: 1 formula and 1 figure. [CS]

SUB CODE: 20/ SUBM DATE: 02Jul65/ ORIG REF: 001/ OTH REF: 003/

Card 1/1 BLG

UDC: 621.375.9:535

2

VOLKOV, Ya.F.; PAVLOV, Yu.S.; TOLOK, V.T.; SKIBENKO, A.I.

[A plasma in a variable magnetic field] Plazma v perekhodnom magnitnom pole. Khar'kov, Fiziko-tekhnik. in-t AN USSR, 1960. 255-266 p. (MIRA 17:3)

S/781/62/000/000/026/036

AUTHORS: Volkov Ya. F., Pavlov Yu. S., Tolok V. K., Skibenko A. I.

TITLE: Plasma in an alternating magnetic field

SOURCE: Fizika plazmy i problemy upravlyayemogo termoyadernogo sinteza;
doklady I konferentsii po fizike plazmy i probleme upravlyayemykh
termoyadernykh reaktsiy. Fiz.-tekhn. inst. AN Ukr.SSR, Kiev, Izd-vo
AN Ukr. SSR, 1962. 127-130

TEXT: The behavior of a plasma pinch in an alternating magnetic field was measured for two types of magnetic fields, one producing a PIG discharge (constant field) and one producing total ionization and detachment of the plasma from the walls. The magnetic field was measured with probes and the density with an electric probe and also with a 4 mm microwave signal. The maximum density was found to be about 10^{15} per cc. In the case of the PIG discharge the density increases sharply toward the second or third maximum of the field, but in the case of no preliminary ionization the maximum occurs at the fourth or fifth maximum. The decrease in density and the breakup of the pinch with constant magnetic field are slowed down when the fields add and accelerate when the fields sub-

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Plasma in an alternating magnetic field

S/781/62/000/000/026/036

tract. This is confirmed by streak photography. Sharp contraction of the plasma gives rise to radial oscillations of the pinch, which are more pronounced in argon than in hydrogen (because the frequency is higher). The slight increase in the magnetic field in the plasma close to the zero of the external field can be attributed to the fact that the plasma traps the magnetic field of the preceding cycle and the latter grows with compression of the plasma by the growing external field. The frequency of the plasma oscillation agrees roughly with the value obtained by Tuck (ref.4, cited in the Russian translation) for plasma in a straight-line discharge. There are four figures.

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S/781/62/000/000/033/036

AUTHORS: Dushin, L. A., Kononenko, V. I., Privezentsev, V. I., Skibenko, A. I., Tolok, V. T.

TITLE: Microwave plasma diagnostics

SOURCE: Fizika plazmy i problemy upravlyayemogo termoyadernogo sinteza; doklady I konferentsii po fizike plazmy i problemam upravlyayemykh termoyadernykh reaktsiy. Fiz.-tekhn. inst. AN Ukr. SSR. Kiev, Izd-vo AN Ukr. SSR, 1962, 156-164

TEXT: Several methods of plasma diagnostics are described, based on the interaction between the electromagnetic field and the plasma, with the electric field of the wave parallel to the external magnetic field, so that the external magnetic field does not influence the character of propagation of the microwaves used for the measurements. The real and imaginary parts of the coefficient of propagation of a microwave signal through a plasma determine the attenuation and the phase constant of the wave. The plasma density is determined by the frequency at which the microwave signal ceases to pass through the plasma. The character of variation of the microwave signal as a function of the pressure was also

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Microwave plasma diagnostics

S/781/62/000/000/033/036

determined. Measurements of the variation of the phase and attenuation of the signal make it possible to follow the variation of the density and the electron collision frequency during the decay of the plasma. Phase measurements yielded also data on the distribution of electron density along the radius. At the present time the use of microwave diagnostics is limited by the capabilities of the microwave radiation sources. Present microwave generators have sufficient power to diagnose plasmas with electron densities near 10^{15} per cu. cm. Once submillimeter equipment is available, the densities can probably raised to 10^{16} - 10^{18} el/cm³. There are 11 figures. Reference is made to work by Wharton (ref. 4, Microwave diagnostics for controlled fusion research, UCRL, 1957) and by Wharton and Slager (J. Appl. Phys. 31, 428 - 430, 1960).

Card 2/2

ACCESSION NR: AT4025301

S/0000/63/000/000/0117/0123

AUTHORS: Dushin, L. A.; Privezentsev, V. I.; Skibenko, A. I.

TITLE: Measurement of longitudinal radiowave propagation for plasma diagnostics

SOURCE: Diagnostika plazmy* (Plasma diagnostics); sb. statey. Moscow, Gosatomizdat, 1963, 117-123

TOPIC TAGS: plasma concentration, plasma electromagnetic property, electromagnetic wave propagation, phase shifter, phase velocity, group velocity

ABSTRACT: It is shown that the density of the plasma can be determined by measuring the phase shift of a radio wave transmitted through the plasma. The propagation of the signal in the ionized plasma in the magnetic field is characterized in the case of longitudinal propagation by the phase and group velocities of the signal. Con-

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ACCESSION NR: AT4025.1

sequently, by measuring the delay time of the signal it is possible to determine the electron density at a given instant of time. Experiments were performed using a pulsed source with a molybdenum-glass discharge tube 10 cm in diameter and 130 cm long. The magnetic field could be varied from 0 to 8000 Oe. A 550 Mc signal was used, and helical antennas were used for the radiation and reception of the signal. The time dependence of the average density was determined from oscillogram patterns of signals of wavelengths 55 cm for longitudinal propagation and 8 mm for transverse propagation of the extraordinary and ordinary waves (magnetic fields 1400 Oe, pressure approximately 10^{-2} mm Hg, sweep duration 1200 μ sec). The results obtained (delay 0.12 μ sec, density $2 \times 10^{14} \text{ cm}^{-3}$) agree well with theory and also with other experiments (O. Pavlichenko, L. Dushin "Optika i spektroskopiya" v. 12, 541, 1962). Orig. art. has: 4 figures and 10 formulas.

ASSOCIATION: None

Card 2/5

ACCESSION NR: AT4025301

SUBMITTED: 19Oct63

SUB CODE: ME, EC

DATE ACQ: 16Apr64

NR REF SOV: 002

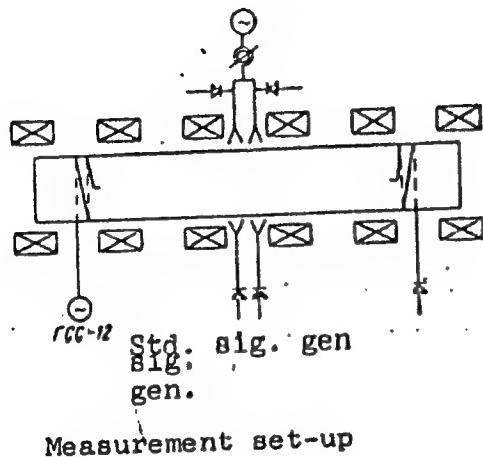
ENCL: 02

OTHER: 000

Card 3/5

ACCESSION NR: AT4025301

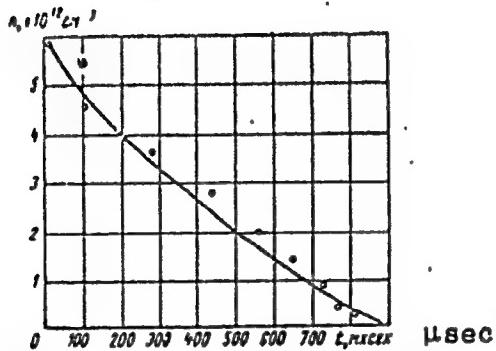
ENCLOSURE: 01



Card 4/5

ACCESSION NR: AT 4025301

ENCLOSURE: 02



Time dependence of average density

Card 5/5

ACCESSION NR: AT4036080

S/2781/63/000/0C3/0357/0364

AUTHORS: Dushin, L. A.; Privezentsev, V. I.; Skibenko, A. I.

TITLE: Microwave methods of plasma measurement in an external magnetic field

SOURCE: Konferentsiya po fizike plazmy* i problemam upravlyayemogo termoyadernogo sinteza. 3d, Kharkov, 1962. Fizika plazmy* i problemy* upravlyayemogo termoyadernogo sinteza (Plasma physics and problems of controlled thermonuclear synthesis); doklady* konferentsii, no. 3. Kiev, izd-vo AN UkrSSR, 1963, 357-364

TOPIC TAGS: plasma research, microwave plasma, plasma magnetic field interaction, plasma decay, plasma concentration

ABSTRACT: The theory of propagation of radio waves in magnetoactive plasma (V. L. Ginzburg, Rasprostraneniye elektromagnitnykh voln v plazme, Fizmatgiz, M., 1960) is used as a basis for an experimental

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ACCESSION NR: AT4036080

investigation of transverse propagation of a plasma in a pulsed Philips source described elsewhere (L. A. Dushin et al. UFZh, 1963) with a discharge tube made of molybdenum glass 130 cm long and 10 cm in diameter. An external homogeneous magnetic field of sinusoidal form was used with a period much longer than the lifetime of the plasma. The field amplitude could be varied from 0 to 640 kA/m. The measurements were made during the time of plasma decay. Experiments were made also for longitudinal propagation of the plasma. They have shown that the use of longitudinal propagation for diagnostics can be quite effective in the case of a high-density plasma, when measurements at relatively low frequencies (compared with the plasma frequency) are possible. High accuracy can be attained by satisfying the conditions of geometrical optics, choosing the ratio of the time of pulse passage to the period of the signal frequency, and allowing for the inhomogeneity of the plasma. The experiments indicate that the methods described can be useful for a permanent or quasipermanent magnetic field. The use of transverse propagation is

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ACCESSION NR: AT4036080

particularly effective when the magnetic field is on the low side of resonance and close to it. Longitudinal propagation is effective when the electron density of the plasma varies little along the length of the column. Longitudinal measurements are also convenient because high plasma concentrations can be measured with the aid of decimeter and centimeter wavelengths. Orig. art. has: 7 figures and 17 formulas.

ASSOCIATION: None

SUBMITTED: 00

DATE ACQ: 21May64

ENCL: 02

SUB CODE: ME

NR REF SOV: 003

OTHER: 001

Card 3/5

ACCESSION NR: AT4036080

ENCLOSURE: 01

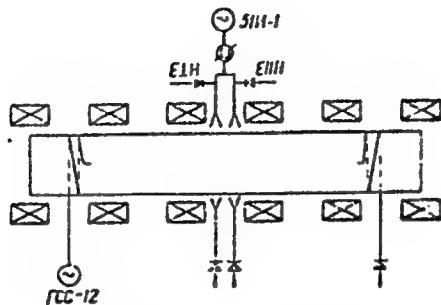
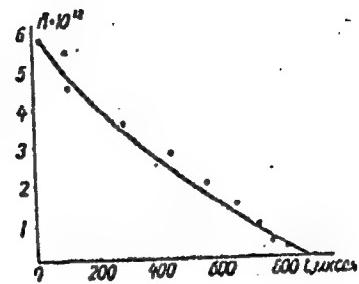
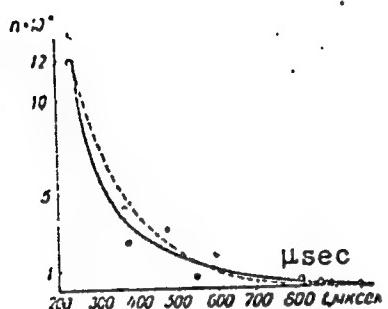


Diagram of set-up

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ACCESSION NR: AT4036080

ENCLOSURE: 02



Time dependence of electron density in transverse propagation (left) and of the average density (right)

Card 5/5

DUSHIN, L.A. [Dushyn, L.O.]; KONONENKO, V.I.; KOVTUN, R.I.; SKIBENKO, A.I. [Skybenko, A.I.]; SINEL'NIKOV, K.D. [Synel'nykov, K.D.]; TOLOK, V.T.

Study of a plasma using a microwave interferometer. Ukr. fiz. zhur. 8 no.7:740-746 Jl '63. (MIRA 16:8)

1. Fiziko-tehnicheskiy institut AN UkrSSR, Khar'kov.
(Plasma (Ionized gases))
(Interferometry)

L 1918-66 EWT(1)/ETC/EPF(n)-2/EWG(m)/EPA(w)-2 LJP(c) AT
ACCESSION NR: AP5024128

UR/0185/65/010/009/0977/0984

77

74

AUTHOR: Dushin, L. O. (Dushin, L. A.); Kononenko, V. I.; Kovtun, R. I.;^{44.55} Pryvezentsev, V. I. (Privezentsev, V. I.); Skybenko, A. I. (Skibenko, A. I.)^{44.55 B}

TITLE: Plasma investigation by means of the interferometer and the microwave cut-off method

SOURCE: Ukrayins'kyy fizychnyy zhurnal, v. 10, no. 9, 1965, 977-984

TOPIC TAGS: plasma decay, plasma measurement, plasma diffusion, plasma electron temperature, plasma diagnostics

1M

ABSTRACT: The present paper describes a method for the study of plasma decay permitting a simultaneous measurement of phases and amplitudes of signals transmitted through the plasma. The phases were measured at 136 Gc/s and the amplitudes at 136.74 and 37 Gc/s. A method for plasma diagnostics by means of signals with different frequencies is also presented. An approximation of the radial plasma density distribution by means of the $F = 1 - (r/R)^{\gamma}$ function is discussed (γ is estimated by the measured mean electron density and the maximum density decrease, R is the radius of the plasma cylinder). An estimate is also made of the relative contributions of recombination and diffusion to the plasma decay process. In the

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L 1918-66

ACCESSION NR: AP5024128

case where recombination is predominant, the recombination coefficient was determined, from which the electron temperature was deduced. A comparison of this temperature with the temperature value obtained by microwave attenuation indicates satisfactory agreement of both methods. Orig. art. has: 27 formulas, 2 figures, and 2 tables.

ASSOCIATION: Fizyko-tehnichnyy instytut AN URSR, Khar'kov (Physics-Engineering Institute, AN Ukr.SSR) *44,55*

SUBMITTED: 09Nov64

ENCL: 00

SUB CODE: ME

NO REF SOV: 005

OTHER: .004

m/c
Card 2/2

L 12863-66 EWT(1)/ETC(F)/EPF(n)-2/EWG(m) — IJP(c) — AT

ACC NR: AT5022300

SOURCE CODE: UR/3137/64/000/067/0001/0015

AUTHOR: Dushin, L. A.; Kononenko, V. I.; Skibenko, A. I.

ORG: Physicotechnical Institute, Academy of Sciences UkrSSR (fiziko-
tekhnicheskiy institut Akademii nauk UkrSSR)

TITLE: Determination of the spatial distribution of plasma density by
microwave refraction

SOURCE: AN UkrSSR. Fiziko-tekhnikheskiy institut. Doklady, no. 067/P-
-021, 1964. Opredeleniye prostranstvennogo raspredeleniya plotnosti
plazmy po refraktsii mikrovoln, 1-15

TOPIC TAGS: plasma density, microwave, plasma discharge

ABSTRACT: It was shown in this work that it is possible to find the
value of plasma density at any point on the cross section of the plasma
by correlating the points at which the beam enters and leaves the plasma
column. The experiments made use of two methods: 1) refraction of
a microwave beam incident on the plasma cylinder at various angles to
its axis; 2) refraction of the beam in the plane normal to the cylinder
axis. The results from both methods agree with each other and with
theoretical calculations. The measurements were made on a plasma column

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L 12863-66

ACC NR: AT5022300

2 m long and 100 mm in diameter, produced by electrodeless discharge. The advantage of these methods over older methods is that only one probing frequency is needed. The use of these methods for investigating quasiconstant and constant plasma simplifies the process of determining density distribution. Present methods can be improved by using micro-wave beams with smaller apertures and higher frequencies and by using several frequencies. A description of the experimental apparatus is given; oscillograms showing receiver signals for various conditions are presented together with a schematic diagram of transmitter and receiver positions relative to the plasma column. The authors consider it their pleasant duty to thank K. I. Stepanov and V. P. Sizonenko for their valuable discussion of the results and for acquainting us with their figures.

SUB CODE: 20/ SUBM DATE: 00/ ORIG REF: 004/ OTH REF: 001

Card 2/2 HW

L 23564-66 EWT(1)/ETC(f)/EPF(n)-2/EWG(m) IJP(c) GS/AT
 ACC NR: AT6008857 SOURCE CODE: UR/0000/65/000/000/0166/0179

AUTHOR: Dushin, L. A.; Kovtun, R. I.; Privezentsev, V. I.; Skibenko, A. I.
 ORG: none

• 71
 B+1

TITLE: Microwave refraction by a nonhomogeneous cylindrical plasma²⁾

SOURCE: AN UkrSSR. Magnitnyye lovushki (Magnetic traps). Kiev, Naukova dumka, 1965,
 166-179

TOPIC TAGS: microwave, plasma density, plasma physics, distribution function

ABSTRACT: The authors consider transmission of microwave beam through a cylindrical plasma with radial density distribution of the form

$$\frac{N(r)}{N_{cr}} = k[1 - (\frac{r}{r_0})^\gamma]$$

where $k = \frac{N_{max}}{N_{cr}}$ and N_{max} is the density at the axis of the cylinder. This expression is integrated with respect to the radius and then averaged to give

$$\gamma = \frac{\bar{N}/N_{max}}{1 - \bar{N}/N_{max}} = \frac{\bar{N}}{N_{max} - \bar{N}}$$

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L 23564-66

ACC NR: AT6008857

where \bar{N} is the density averaged with respect to the radius. Thus a distribution function may be easily found which gives a nearly homogeneous form of distribution at large γ and is close to a δ -function when $\gamma \rightarrow 0$, by simultaneously measuring the maximum density and the density averaged with respect to the radius. The trajectory of a microwave beam in a cylindrical plasma is calculated and the effect of beam distortion during measurement of signal attenuation is considered. Experiments are conducted to determine the density distribution in a discharge column. The experimental data are analyzed on the basis of the formulas derived in the paper. Orig. art. has: 8 figures, 21 formulas.

SUB CODE: 20/ SUBM DATE: 200ct65/ ORIG REF: 006/ OTH REF: 004

Card 2/2 PV

L 23567-66

EWT(1)/EPF(n)-2/ETC(f)/EWG(m)

IJP(c)

GS/AT

ACC NR: AT6008858

SOURCE CODE: UR/0000/65/000/000/0179/0188

AUTHOR: Dushin, L. A.; Kononenko, V. I.; Skibenko, A. I.

ORG: none

TITLE: Using microwave refraction to determine the spatial density distribution of a plasma

SOURCE: AN UkrSSR. Magnitnyye lovushki (Magnetic traps). Kiev, Naukova dumka, 1965, 179-188

TOPIC TAGS: distribution function, microwave, plasma density, plasma physics

ABSTRACT: A method is proposed for using refraction of microwave beams to determine the spatial density distribution of a plasma on the basis of a single probing frequency for any moment of time. The method is applicable both to the case of a flat plasma and also for cylindrical plasma formations. In the case of a plasma with a plane or nearly flat surface, the spatial distribution may be found from the refraction of microwave beams which are incident at an angle to the surface of the plasma. There is a continuous change in the direction of the microwave beam due to the density gradient in the plasma. Analytical formulas are given for determining the density distribution from the trajectory of the beam in the plasma. When the plasma being studied is axially symmetric, the spatial density distribution may be determined from the refraction

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B+1

L 23567-66

ACC NR: AT6008858

of microwave beams in a plane normal to the axis of the discharge. The use of this method is discussed. The proposed methods may be improved by using microwave beams with small apertures and by operation on shorter wavelengths. Orig. art. has: 9 figures, 8 formulas.

SUB CODE: 20/ SUBM DATE: 200ct65/ ORIG REF: 004/ OTH REF: 001

Card 2/2 RG

ACC NR: AT5028593 SOURCE CODE: UR/0000/65/000/000/0512/0519
AUTHOR: Dushin, L. A.; Privezentsev, V. I.; Skibenko, A. I.

ORG: none

90
B+1

TITLE: Use of transverse extraordinary waves in plasma diagnostics

SOURCE: Konferentsiya po fizike plazmy i problemam upravlyayemogo termoyadernogo sinteza. 4th, Kharkov, 1963. Fizika plazmy i problem upravlyayemogo termoyadernogo sinteza (Physics of plasma and problems of controllable thermonuclear synthesis); doklady konferentsii, no. 4. Kiev, Naukova dumka, 1965, 512-519

TOPIC TAGS: plasma diagnostics, microwave spectroscopy, gas discharge spectroscopy

ABSTRACT: The extraordinary wave is used in conjunction with the usually employed ordinary wave to expand the microwave diagnostic techniques to the measurement of both electron density and collision frequency in a plasma. It is shown that the form of the dielectric constant associated with the extraordinary wave determines three electron density values (all within a factor of 2 for magnetic field of 310 kA/m). This was also confirmed experimentally and shown to be in agreement with the control data obtained using the ordinary wave. In the case when collisions in the plasma cannot be neglected, it is necessary to consider the attenuation of the extraordinary wave, which depends on magnetic field intensity, collision frequency, and density. An

Card 1/2

L 10224-66

ACC NR: AT5028593

attenuation coefficient is plotted for several sets of these parameters. This is in turn used with the ordinary wave cut-off data to obtain the collision frequency. Experimental data obtained by using both waves (8 mm wavelength) is used to determine the collision frequency in the decaying plasma of a pulsed Phillips discharge. Phase changes in the transmitted wave are also briefly discussed, and it is pointed out that its measurement can be useful for diagnostics only at higher magnetic fields. [14]

SUB CODE: 20 SUBM DATE: 20May65/ ORIG REF: 003/ OTH REF: 001
ATD PRESS: 4163

Card 5 1/2

L 10238-66	EWT(1)/ETC/EPF(n)-2/ENG(m)	IJP(c)	AT/GS
ACC NR:	AT5028594	SOURCE CODE:	UR/0000/65/000/000/0519/0526
AUTHOR:	Dushin, L. A.; Privezentsev, V. I.; Skibenko, A. I.	44.55	44.55
ORG:	none	55 BT	
TITLE: Microwave methods of plasma diagnostics employing longitudinal propagation of radiowaves			
SOURCE: Konferentsiya po fizike plazmy i problemam upravlyayemogo termoyadernogo sinteza. 4th, Kharkov, 1963. Fizika plazmy i problemy upravlyayemogo termoyadernogo sinteza (Physics of plasma and problems of controllable thermonuclear synthesis); doklady konferentsii, no. 4, Kiev, Naukova dumka, 1965, 519-526.			
TOPIC TAGS: plasma diagnostics, microwave spectroscopy			
ABSTRACT: Application of microwaves propagating in plasma along the direction of the external magnetic field is considered in order to broaden the scope of measurements of plasma parameters. The general form of the index of refraction for both ordinary and extraordinary waves which is valid for some arbitrary direction of the magnetic field relative to the direction of the incident wave is considered. The form of the phase and the attenuation coefficient for the wave in the same degree of generalization is also utilized. Both hold for situations where the collision frequency is not negligible. The values of magnetic field density and collision fre-			
Card 1/2			

REF ID: A1100859

DATA CODE: UP/0000/65/000/000/0109/0120

AUTHOR: Bushin, L. A.; Kononenko, V. I.; Kvetkin, R. I.; Prigozintsev, V. I.;
Skibenko, A. I.

OPG: none

TITLE: Studying a plasma by probing with microwaves

SOURCE: AN UkrSSR. Magnitnyye lovushki (Magnetic traps). Kiev, Naukova dumka, 1965,
189-198

TOPIC TAGS: microwave, plasma structure, plasma density, distribution function

ABSTRACT: The authors determine the spatial density distribution function for a plasma by comparing the average density measured by a microwave interferometer with the maximum density determined from the cutoff time of the microwave signals. These data were used for finding the recombination and diffusion coefficient and for estimating the electron temperature in the discharge. The experimental procedure is described in detail and the derivation of the analytical formulas used in the work is discussed. It is shown that curves for the average and maximum plasma densities or their logarithms as functions of time will coincide as long as there is no noticeable diffusion to destroy the initial distribution. The results confirm the data in the literature obtained by spectroscopic analysis of a Phillips discharge. Orig. art. has: 4 figures, 17 formulas.

SUB CODE: 20/

SUBM DATE: 200ct65/

ORIG REF: 005/

OTH REF: 002

Card 1/1

DUSHIN, L.A. [Dushyn, L.O.]; KONONENKO, V.I.; KOVTUN, R.I.; PRYVEZENTSEV,
V.I. [Pryvezentsev, V.I.]; SKIBENKO, A.I. [Skybenko, A.I.]

Use of an interferometer and the microwave cut-off method in
studying a plasma. Ukr. fiz. zhur. 10 no.9:977-984 S '65.
(NIRA 18:9)

1. Fiziko-tehnicheskiy institut AN UkrSSR, Khar'kov.

L D 2005-67 JRP(1) RJP(c) AP
ACC NR: AP6033420

SOURCE CODE: UR/0057/66/036/010/1842/1850

45
B

AUTHOR: Dushin, L. A.; Kononenko, V. I.; Skibenko, A. I.

ORG: none

TITLE: A study of spatial density distribution of plasma by refraction of a microwave ray with several frequency components

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 36, no. 10, 1966, 1842-1850

TOPIC TAGS: plasma density, plasma charged particle, plasma structure

ABSTRACT: Measurement of spatial distribution density of non-uniform plasma by refraction of a microwave ray having several frequency components was studied. Spatial distribution density was measured in a plane normal to and in a plane passing through the axis of a decaying plasma cylinder formed by pulsed induction discharge. Measurements were made by refracting microwave rays in a plane containing the cylinder axis and in a plane perpendicular to the cylinder axis. The equipment used in both cases included a transmitter and a receiver. The transmitter had a high-frequency generator that fed a signal containing 2, 4, and 8 mm wavelength components (providing adequate range for measurement of plasma densities up to 10^{14} particles/cm²) to the transmitting antenna. The receiver consisted of an antenna, a frequency separator, detectors, preamplifiers, and oscilloscopes. The last recorded arrival times of each of the three pulse-component wavelengths at either fixed or varied

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UDC: 533.9.07

23205-67
ACC NR: AP6033420

angular positions of the transmitter-receiver antennas relative to the cylinder axis.
Spatial distribution densities calculated from the above data varied between 10^{12} and
 10^{14} particles/cm³. Orig. art. has: 10 figures and 11 formulas.

SUB CODE: 20/ SUBM DATE: 21Oct65/ ORIG REF: 005/ OTH REF: 002/ ATD PRESS: 5099

Card 2/2 AWM

41008-66 ENT(1)/ENT(m)/T IIP(c) DS/AT
ACC NR: APG018730 SOURCE CODE: UR/0057/66/036/006/1049/1054

AUTHOR: Zolototrubov, I.M.; Skoblik, I.P.; Skibenko, A.I.; Ryzhov, N.M.

ORG: none

TITLE: Structure of the plasmas emitted by a coaxial plasma gun with different electrode polarities

SOURCE: Zhurnal tehnicheskoy fiziki, v. 36, no. 6, 1966, 1049-1054

TOPIC TAGS: plasma gun, hydrogen plasma, plasma velocity, plasma density, electrode polarity, PLASMA STRUCTURE

ABSTRACT: The authors investigated the influence of electrode polarity and duration of the delay between gas injection and discharge of the gun on the structure of the plasmas ejected during the first half-period (6.5 microsec) of operation of a 60 cm long coaxial plasma gun with electrode diameters of 3 and 6.5 cm. The gas was admitted during the course of 80 microsec through a single opening in the center of the outer electrode, and the gun was fired after a delay ranging from 100 to 260 microsec by the discharge of a 20 kV, 12 microfarad capacitor. The plasmas were investigated in a 10 cm diameter, 1.2 m long glass drift tube with the aid of two diamagnetic probes, an 8 mm wavelength microwave interferometer, a 4 mm wavelength microwave beam, and a thermal probe. Under all conditions there was observed a jet of unionized gas with a

Card 1/2

UDC: 533.9

L 41008-66
ACC NR: AP6018730

velocity of 2×10^6 cm/sec. When the inner electrode of the plasma gun was positive there were ejected three plasma bursts with velocities (when the delay time was 100 microsec) of 5×10^7 , 1.5×10^7 and 5×10^6 cm/sec and particle densities of less than 10^{12} , 6×10^{12} , and 7×10^{13} cm⁻³, respectively. When the inner electrode was negative there were only two plasma bursts, with velocities and particle densities (again for a delay time of 100 microsec) of 3.5×10^7 and 8.7×10^6 cm/sec, and 3.5×10^{12} and 7×10^{13} cm⁻³, respectively. The velocity of the slowest burst was almost independent both of delay time and of electrode polarity, and its density, also independent of electrode polarity, increased with increasing delay time. The velocities and densities of the faster bursts decreased with increasing delay time. The authors thank L.A.Dushin, V.T.Tolok, O.M.Shavets, and Ya.F.Volkov for discussions. Orig. art. has: 2 formulas, 6 figures and 2 tables.

SUB CODE: 20 SUBM DATE: 18Mar65 ORIG. REF: 006 OTH REF: 001

Card 2/2 hs

TITLE: Anomalous decay
charge in a strong magnetic field

18 Mar 65 1800-1807

ACC NR: AP6033414

which was independent of the plasma density but decreased with increasing gas pressure. The signal of the microwave interferometer was found to be modulated at a frequency which decreased with time from about 2 MHz to 0.4 MHz. It is concluded that the anomalously rapid decay of the plasma is due to large scale drift instabilities that develop during the current pulse. These instabilities also lead to a turbulent condition of finite duration which the authors intend to investigate. Orig. art. has: 5 formulas and 10 figures.

SUB CODE: 20 SUBM DATE: 21Oct65 ORIG. REF: 011 OTH REF: 001

Card 2/2

"The position of our present day of the subject organization operation
and activity of the section." Evaluated Sci. Ass't Inst for the Advanced Ranking
of Materials, Inc., 1943. (U, 1e 7, Feb 55)

31: DIA, 1e 31, 1945 (U) - Survey of Scientific and Technical Missions to
International Organizations (U)

SKIBENKO, N.V., kand.med.nauk

Malignant leiomyoma of the rectum. Klin. khir. no.1:59-60 '65.
(MIRA 18:8)

1. Kafedra gospital'noy khirurgii (zav. - dotsent L.P.Shulyak)
Ternopol'skogo meditsinskogo instituta.

ACCESSION NO: A74006071

S/2781/63/000/003/0283/0294

AUTHORS: Borovik, Ye. S.; Busol, F. I.; Yuferov, V. B.; Skibenko,
Ye. I.

TITLE: Investigation of supersonic jet of carbon dioxide as a target
for charge exchange of ions

SOURCE: Konferentsiya po fizike plazmy* i problemam upravlyayemogo
termoyadernogo sinteza. 3d, Kharkov, 1962. Fizika plazmy* i prob-
lemy* upravlyayemogo termoyadernogo sinteza (Plasma physics and
problems of controlled thermonuclear synthesis); doklady* konferen-
tsii, no. 3. Kiev, Izd-vo AN UkrSSR, 1963, 283-294

TOPIC TAGS: supersonic gas flow, gas jet, charge exchange, magnetic
trap, cryogenic treatment, carbon dioxide, condensation

ABSTRACT: The described investigation is one of the stages of research done by the authors to develop a hydrogen-cooled magnetic

Card 1/5

ACCESSION NR: AT4036071

trap and produce intense beams of fast neutral hydrogen or deuterium atoms. On the basis of cryogenic methods developed at the author's Institute, it is proposed to use as charge-exchange targets supersonic jets of gases such as CO_2 , N_2 , O_2 , Ar, and H_2 flowing in vacuum and completely condensed on a cooled surface (78K). The experiments reported were made with carbon dioxide. The main parameters of a supersonic jet of this gas are first derived, after which the experimental results, the seed proportions, and the results are discussed. Various configurations of cryostat are assumed. In spite of the fact that the jet was not fully condensed and had an inverse profile, it is shown that the use of carbon dioxide as a target material is feasible particularly if the temperature of the gas entering the trap-target tube is increased. The possibility of the formation of a cold CO_2 diode plasma can be frozen out in a certain manner and the possibility of controlling a closed-cycle system are also considered. Future experiments are planned at ascertaining the possibility of other gases and deeper cooling. "The authors thank

Card 2/5

ACCESSION NR: AT4036071

Ya. M. Fogel', D. V. Pilipenko, and S. G. Konovalov for measuring the capture cross section and electron loss of fast protons and hydrogen atoms in CO₂." Orig. art. has: 4 figures, 7 formulas, and 1 table.

ASSOCIATION: None

SUBMITTED: 00 DATE ACQ: 21May64 ENCL: 02

SUB CODE: ME, NP NR REF SOV: 007 OTHER: 003

Card 3/5

ACCESSION NR: AT4036071

ENCLOSURE: 01

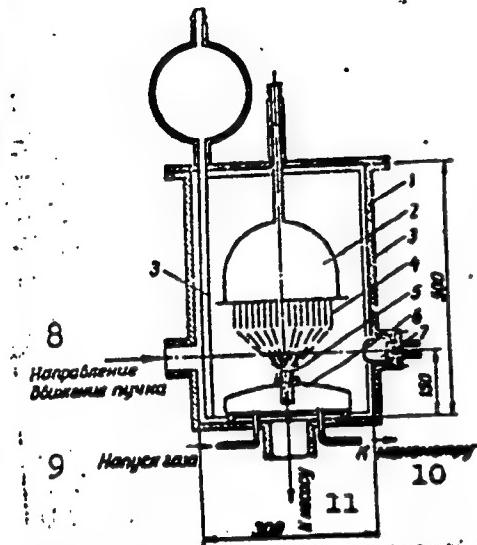


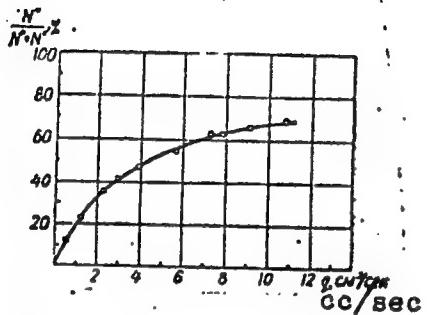
Diagram of charge-exchange chamber:

- 1 - chamber, 2 - condenser, 3 - screen,
4 - copper plates, 5 - outflow chamber,
6 - Laval nozzle, 7 - Paraday cup with
calorimeter, 8 - direction of beam motion,
9 - gas inlet, 10 - to manometer, 11 - to pump

Card 4/5

ACCESSION NR: A04036071

ENCLOSURE: 02



Yield of neutral atoms as a function of the CO_2 flow. Mixed beam of hydrogen ions, $E = 19.5$ keV

Card 5/5

L 18483-63

EPR/EPA(b)/EWT(1)/BDS AEDC/AFFTC/ASD/APMDC Ps-4/Pd-4 WW
ACCESSION NO: AP0305510 S/0057/63/033/C03/0973/0981

AUTHOR: Borovik,Ye.S.; Busol,F.I.; Vuforov,V.B.; Skibenko,Ya.I.

70
67

TITLE: Investigation of a supersonic carbon dioxide jet as a target for ionic charge exchange

SOURCE: Zhurnal tehnicheskoy fiziki, v.33, no.3, 1983, 973-981

TOPIC TAGS: high energy neutral beam , charge exchange target , CO₂, H, hydrogen

ABSTRACT: As part of a continuing program directed toward obtaining high energy beams of neutral hydrogen and deuterium atoms, the charge exchange between a high energy proton beam and a supersonic carbon dioxide jet was investigated. The proton beam was produced in an arc source of the type described by J. Kistemaker and H. L. Dowes Deldker (Physica, 16, 193, 1950); it was focused by a three element electrostatic lens and emerged through a 1 mm aperture. The beam current was about 1 mA and the proton energy was varied from 15 to 25 keV. After horizontally traversing the 30 cm diameter metal charge exchange chamber, the beam impinged on a calorimeter contained within a Faraday cup. Thus both the beam current and the beam energy flux could be measured and the fraction of neutral atoms present could be obtained.

Card 1/2

L 18483-63

ACCESSION NO.: AEC 05510

3

The jet of purified carbon dioxide issued from a Lavale nozzle below the proton beam and was caught on a condenser cooled with liquid nitrogen above it. When the carbon dioxide flux was increased from 0 to 15 cm³/sec the pressure within the chamber rose from (1-1)x10⁻⁵ to (5-10)x10⁻⁵ mm Hg. This is ascribed to incomplete condensation of the carbon dioxide. A further small rise in pressure would occur when the beam was turned on; this is ascribed to the formation of CO and O₂ molecules, but the relevant cross sections could not be obtained. The fraction of neutral atoms in the beam rose with increasing carbon dioxide flux, and at a flux of 13-15 cm³/sec it attained a saturation value of 70-75%, which agrees with the theoretical equilibrium value for a thick target. In conclusion, we consider it our pleasant duty to express our deep gratitude to V. M. Kondratenko, J. I. Pilipenko and O. G. Konovakov who, at our request, measured the cross sections for capture and loss of electrons by fast protons on nitrogen atoms in It has: 10 formulas, 4 figures, 2 tables.

REF ID: A6510

SUBMITTED: CECUL-2

DATE REC'D: 0886, JN

ENCL: 30

SUB CODE: PH

NO REC'D BY: COV

OTHER: 003

Card 2/2

L 23817-65 EWT(1)/EWP(m)/EPR/FCS(k)/EWA(1) Pd-1/Ps-4 WW

ACCESSION NR: AP5000840

S/0057/64/034/012/2156/2159

AUTHOR: Busol, F.I., Yuferov, V.B., Skibenko, Ye.I.

TITLE: Improvement of the vacuum in a charge exchange chamber in the proximity
of the supersonic gas jet B

SOURCE: Zhurnal tekhnicheskoy fiziki, v.34, no.12, 1964, 2156-2159

TOPIC TAGS: vacuum device, vacuum technique, charge exchange

ABSTRACT: In earlier studies by the authors (ZhTF 33, No.8, 1963; Sb. Fizika plazmy i problemy upravlyayemogo termouadrennogo sinteza (Plasma physics and problems in controlled thermonuclear synthesis) No.3, AN USSR, Kiev 1963), devoted to investigation of CO₂, A and N₂ jets as targets for charge exchange, it was found that in the proximity of an optimum density supersonic gas jet one can obtain and maintain a vacuum of only about 5×10^{-3} Newton/m²; yet under the given experimental conditions, where the target should be as close as possible to the working region, a vacuum of 10^{-6} to 10^{-7} N/m² is required. Accordingly, it was essential to improve the vacuum in the proximity of the gas jet. Analysis of the gas flow conditions (turbulent with near isotropic velocity distribution at the nozzle outlet) led to

1/3

L 23817-65

ACCESSION NR: AP5000840

development of the device described in the present paper. The arrangement is diagramed in the Enclosure. The tests were carried out on the setup used in the above mentioned studies. As before, the vacuum was measured by means of an IM-2 ionization gage located in a blind branch off the charge exchange chamber at a distance of 150 mm from the nozzle. The results of test runs with different shielding arrangements and then with different heights of the shielding tube (4 in figure) are presented in the form of curves. The tests were made only with argon and carbon dioxide. The test results indicate that the vacuum in the vicinity of the "target" jet in a charge exchange chamber can be substantially enhanced by the simple device described, which effectively simplifies the design of the vacuum separation components of the chamber installation. Orig.art has: 5 figures.

ASSOCIATION: Fiziko-tehnicheskiy institut AN UkrSSR, Khar'kov (Physicotechnical Institute, AN UkrSSR)

SUBMITTED: 22Jul63

ENCL: 01

SUB CODE: ME

NR REF Sov: 002

OTHER: 000

2/3

L 23817-65
ACCESSION NR: AP5000840

ENCLOSURE: 01

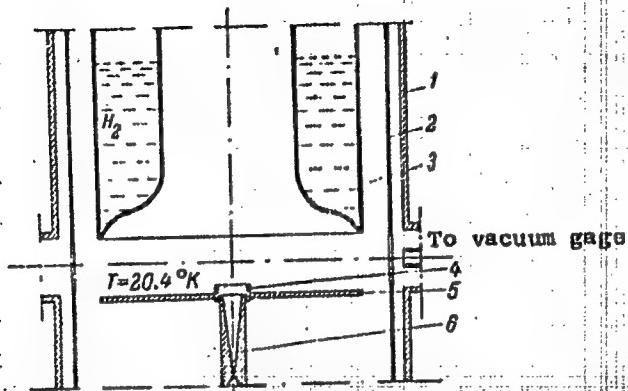


Diagram of the shielding device: 1 - chamber, 2 - nitrogen screen,
3 - condensing element, 4 - shielding tube, 5 - disk, 6 - nozzle.

3/3

L 8198-66 EWT(1)/EWT(m)/EPF(n)-2/EWG(m)/FWA(d)/FWB(m)/FWC(t)/FCG(k)/EWP(b)/EWA(1)
ACC NR: AT5022295 IJP(c) JD/100/A1 SOURCE CODE: UK/313/04/000/053/0001/0004
44,55 44,55 44,55 44,55

AUTHOR: Yuferov, V. B.; Kovalenko, V. A.; Skibenko, Ye. I.; Busol, F. I.

ORG: Academy of Sciences UkrSSR, Physicotechnical Institute (Akademiya nauk UkrSSR,
Fiziko-tehnicheskiy institut)

TITLE: Supersonic hydrogen stream in a vacuum

SOURCE: AN UkrSSR. Fiziko-tehnicheskiy institut. Doklady, no. 053/P-012, 1964.
Sverkhzvukovaya struya vodoroda v vakuume, 1-4

TOPIC TAGS: supersonic flow, particle beam, hydrogen plasma, plasma heating

ABSTRACT: A brief discussion of the need for and means of producing supersonic hydrogen stream by means of new cryogenic techniques is presented. The apparatus and experimental conditions are described in earlier papers by the authors. The critical problem is the amount of heat transfer from the gas to the helium-cooled walls of the channel; it is one order higher than that measured in other experiments with argon and CO₂. It was found that the pressure in the flow was not determined by the flow conditions alone but also by the large temperature difference between liquid helium and the surfaces in contact with the stream. These supersonic streams can be successfully used for the charge exchange schemes used with intense ion beams needed for neutral injection techniques in the production of hot plasmas. Orig. art. has: 1 figure.

SUB CODE: 20/ SUBM DATE: 00/ ORIG REF: 005/ OTH REF: 001
Card 1/1

L 8318-66 EWT(1)/EWP(m)/EWA(d)/T/FCS(k)/EWA(m)-2/EWA(1) IJP(c) ^{WW}
ACC NR: AT5022296 SOURCE CODE: UR/3137/64/000/052/0001/0006

AUTHOR: Borovik, Ye. S.; Busol, F. I.; Kovalenko, V. A.; Skilchenko, Ye. I.; Yuferov, V. B.

ORG: Academy of Sciences UkrSSR, Physicotechnical Institute (Akademiya nauk UkrSSR, Fiziko-tehnicheskiy institut)

TITLE: Ionization of fast hydrogen atoms in strong magnetic fields

SOURCE: AN UkrSSR. Fiziko-tehnicheskiy institut. Doklady, no. 052/P-011, 1964.
Ionizatsiya bystrykh atomov vodoroda v sil'nom magnitom pole, 1-6

TOPIC TAGS: supersonic flow, gas ionization, strong magnetic field, fast particle

ABSTRACT: The ionization of fast (30 kev) hydrogen atoms moving through a strong magnetic field was measured. The magnetic field, reaching a maximum of 60 kg, was produced by a multi-turn solenoid having a good field uniformity. The neutral beam was obtained through charge exchange of the ions passing through a supersonic gas flow. A schematic diagram shows the set of electrodes used in determining ions and electrons. The neutral beam current (about 10^{-4} amp) was obtained by using a sensitive calorimeter calibrated by an ion beam. Typical ion and neutral currents and magnetic field oscilloscopes are shown. Such data was used to obtain the graph of the fraction of ionized species as a function of the magnetic field (figure 1). This result and other

Card 1/2

L 8318-66

ACC NR: AT5022296

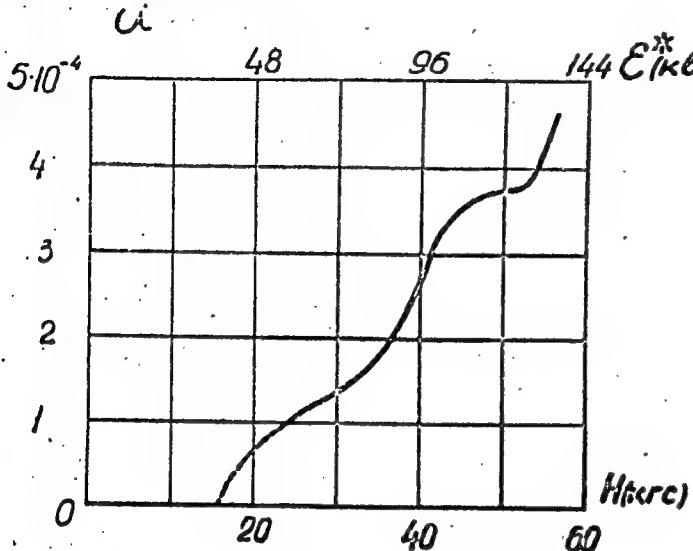


Fig. 1.

SUB CODE: 20/

SUBM DATE: 00/

ORIG REF: 004/

OTH REF: 005

CC 2/2

D

data lead the authors to conclude that at lower magnetic fields (in the range 32-51 kg) the atoms with the principal quantum number $n = 9$ are ionized predominantly. At higher values of the magnetic field, atoms with $n = 8$ are also ionized and the fraction of ionized atoms begins to increase rapidly. This work agrees with the measurements of the fraction of the hydrogen atoms which are ionized in other reported experiments. Orig. art. has: 3 figures.

L 2487-66 EWT(1)/EWP(m)/EWT(m)/EPF(c)/EWA(d)/EPA(w)-2/EWP(j)/EWP(t)/FCS(k)/EWP(b)/
ETC(m)/EWA(1) IJP(c) JD/WW/JW/RM
ACCESSION NR: AP5020744 UR/0057/65/035/008/1522/1523

AUTHOR: Yufarov, V. B.; Kovalenko, V. A.; Skibenko, Ye. I.; Busol, F. I. 80

Title: Supersonic hydrogen jet in a vacuum 78

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 35, no. 8, 1965, 1522-1523 B

TOPIC TAGS: gas jet, supersonic flow, hydrogen, vacuum, particle accelerator target, charge exchange

ABSTRACT: The authors have produced and investigated supersonic hydrogen jets in vacuum, using the same apparatus and techniques that they and collaborators have previously employed to produce and investigate CO₂, Ar, and N₂ jets (ZhTF, 33, No. 8, 1963; Sb "Fizika plasmy i problemy upravlyayemogo term. sinteza", vol. 3, p. 294. Izd. AN USSR, Kiyev, 1963; ZhTF, 34, No. 12, 1964; ZhTF, 33, 100, 1963). The experiments were undertaken because of the usefulness of hydrogen jets as charge exchange targets for producing high energy neutral atom beams for injection into thermonuclear devices. Difficulties arise from the low heat of vaporization of the liquid helium that must be used to remove the hydrogen. With a hydrogen flux of 50 cm³/sec, the pressure in the charge exchange chamber was approximately 7×10^{-5} mm Hg. It is believed that by improving the thermal insulation of the condenser it

Card 1/2

16

L 18838-66 EWT(1) IJP(c) 4W/GS
ACC NR: AT5028591

SOURCE CODE: UR/0000/65/000/000/0421/0431

AUTHOR: Borovik, Ye. S.; Busol, F. I.; Kovalenko, V. A.; Yuferov, V. B.; Skibenko, Ye. I.

ORG: none

21,44,55 21,44,55
TITLE: Magnetic trap with a strong magnetic field

SOURCE: Konferentsiya po fizike plazmy i problemam upravlyayemogo termoyadernogo sinteza. 4th, Kharkov, 1963. Fizika plazmy i problemy upravlyayemogo termoyadernogo sinteza (Physics of plasma and problems of controllable thermonuclear synthesis); doklady konferentsii, no. 4. Kiev, Naukova dumka, 1965, 421-431

TOPIC TAGS: strong magnetic field, magnetic trap, plasma injection, liquid nitrogen, liquid hydrogen, magnetic mirror, charge exchange, vacuum pump

ABSTRACT: The design of the magnetic mirror with a very strong magnetic field described in this work is similar to that of other machines which generate hot plasmas by injection of neutral hydrogen atoms. The features of a neutral beam injector, charge exchange cell and beam trap are described. The method of achieving strong magnetic fields necessary in such machines depends on a newly developed technique

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L 18838-66
ACC NR: AT5028591

which is described in this work. Magnetic fields in the magnetic trap of 10 tesla were attained by cooling multturn (4280 turns) coils with an inner diameter of 5 cm. Two-stage cooling with liquid nitrogen followed by liquid hydrogen to 20.4°K made it possible to energize the coil twice an hour. The coils and cooling system construction are described in detail. The inductance and resistance of such coils was determined to be 0.8 h and 0.21 ohms at low temperature. Two coil sections with variable separation along their axis can be used to provide a suitable magnetic field configuration normally forming a working volume of $3.35 \cdot 10^{-4} \text{ m}^3$ with a very uniform field. The entire assembly was placed in a vacuum jar in which the neutral injection experiment is performed. Very high capacity pumps ($70 \text{ m}^3/\text{sec}$) provide the necessary vacuum conditions. Orig. art. has: 6 figures.

SUB CODE: 20/ SUBM DATE: 20May65/ ORIG REF: 014/ OTH REF: 006

Card 2/2 vmb

L 23096-66 EWT(1)/ETC(f)/EPF(n)-2/ENG(m) IJP(c) AT

ACC NR: AP6007079

UR/0057/68/036/002/0304/0312

AUTHOR: Dushin,L.A.; Kononenko,V.I.; Sizonenko,V.L.; Skibenko,A.I.; Stepanov,K.N.

ORG: None

TITLE: Determination of plasma density distribution by microwave refraction

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 36, no. 2, 304-312

TOPIC TAGS: plasma diagnostics, plasma density, plasma decay, microwave, electromagnetic wave refraction

ABSTRACT: Fermat's principle is employed to calculate the path of a microwave beam in a cylindrical plasma in which the density decreases monotonically with increasing distance from the axis for the two cases in which the beam lies in a plane containing the axis of the plasma cylinder or in a plane perpendicular to the axis. For each case there is derived an equation that gives the plasma density as a function of the distance from the axis implicitly in terms of the position at which the microwave beam leaves the plasma as a function of the angle of incidence. It is proposed that these equations be used to determine plasma density distributions from microwave refraction measurements. The proposed techniques were tested by measuring density distributions in decaying hydrogen plasmas at 5×10^{-2} mm Hg in a 2 m long 10 cm diameter quartz tube. The apparatus is described in more detail elsewhere by I.Adamov, L.Dushin, V.Kononenko,

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UDC: 533.9

L 13076-66
ACC NR: AP6007079

and O. Pavlichenko (Atomnaya energiya, 16, No. 2, 99, 1964). Microwaves of 8 mm wavelength were employed, and the radiating and receiving horns were provided with dielectric lenses that rendered the beam nearly parallel. For each run the antennas were held in fixed positions and the time after excitation of the plasma at which the refracted wave was received by the receiving antenna was recorded with an oscilloscope. Many such runs were made with the antennas in different positions and inclined at different angles, and from the accumulated data curves were constructed giving the position of the antenna as a function of the incidence angle for different times. From these curves the electron density of the plasma was calculated as a function of time and distance from the axis. Measurements were made both with the beam in a plane containing the axis of the plasma cylinder and with the beam in a plane perpendicular to the axis. Good agreement was obtained between the different measurements, and it is concluded that the proposed techniques are satisfactory. The techniques can be improved by employing narrower microwave beams and shorter wavelengths. It is also possible to vary the wavelength instead of the incidence angle. Orig. art. has: 14 formulas and 12 figures.

SUB CODE: 20/ SUBM DATE: 22Feb65/ ORIG REF: 001/ OTH REF: 002

Card 2/2 UVR

L 24047-66 EWT(1) IJP(c) WW/GS/AT/GW
ACC NR: AT6008842

SOURCE CODE: UR/0000/65/000/000/0040/0044

AUTHOR: Borovik, Ye. S.; Busol, F. I.; Kovalenko, V. A.; Skibenko, Ye. I.; Yuferov, V. B.

ORG: none

2/
TITLE: Ionization of fast hydrogen atoms in a strong magnetic field

SOURCE: AN UkrSSR. Magnitnyye lovushki (Magnetic traps). Kiev, Naukova dumka, 1965,
40-44

TOPIC TAGS: strong magnetic field, hydrogen plasma, gas ionization, charge exchange,
plasma physics, atom , fast particle

ABSTRACT: Data are given from preliminary experiments on determining the fraction of α -hydrogen atoms with an energy of 30 kev ionized by the Lorentz force in a magnetic field with an intensity of up to 60 kev. In contrast to Sweetman's experiments (D. R. Sweetman, Nuclear Fusion Suppl. 1962, part 1, p 279) where the quantity α was evaluated from the stream of fast atoms generated during charge exchange between trapped ions, the authors of this paper measured directly the number of ions formed when a beam of neutral hydrogen atoms passes through a magnetic field. A strong magnetic field was produced by two copper solenoids with internal and external diameters of 5 and 22 cm respectively. The solenoids were cooled to low temperatures and supplied

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Card 1/3

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L 24047-66

ACC NR: AT6008842

by a battery of capacitors. The buildup time for a maximum field intensity of about 60 kilogauss in the center of the gap between the coils was 0.26 seconds. There was a 4.5% reduction in the field at a radius of 2.5 cm from the axis. The beam of neutral hydrogen atoms was produced by charge exchange between an ion beam and a supersonic jet of carbon dioxide frozen on a surface cooled by liquid hydrogen. The charge exchange target was 0.9 meters from the axis of the magnetic system. The fraction of the particles ionized in the central region of the field (with a radius of about 2.2 cm) was determined by simultaneously measuring the equivalent "current" of the neutral atoms and the ion current through the central collector (see figure) situated with respect to the beam and to the two other collectors (input and output) in such a way

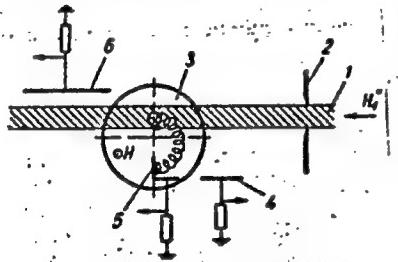


Diagram showing the location of the ion collectors in the magnetic field:
1--beam of hydrogen atoms; 2--diaphragm; 3--central region of the field; 4--input collector; 5--central collector; 6--output collector

that all ions formed in this region are incident on the central collector due to azi-

Card 2/3

L 24047-66

ACC NR: AT6008842

mutual drift in the nonhomogeneous field only for the case of fields exceeding 25 kilogauss. In the case of weaker fields, some of the ions from the central region are incident on the input and output collectors and when the fields are still weaker (below 12-15 kilogauss) not one of the particles ionized in this region of the field can reach the central collector. A curve is given showing the fraction of atoms ionized in the central region of the field as a function of field intensity. A comparison between this curve and the data in the literature on ionization thresholds and regions for individual levels of the hydrogen atom with a given principal quantum number n shows that atoms with $n = 9$ are ionized in magnetic fields ranging from approximately 32 to 51 kilogauss. Ionization of atoms with $n = 8$ takes place in still stronger fields. Even in extremely strong fields, a continues to grow rapidly with an increase in H . In some experiments the current through the output collector was much greater than could have been expected for residual gas ionization. This shows that a considerable number of hydrogen atoms may have been excited to levels which allowed them a mean free path of several centimeters in strong magnetic fields without ionization.

Orig. art. has: 3 figures.

SUB CODE: 20/ SUBM DATE: 200ct65/ ORIG REF: 004/ OTH REF: 005

Card 3/3 dde

L 24051-66 EWT(d)/EWT(1)/EWP(m)/EWT(m)/EEC(k)-2/EPF(n)-2/EWA(d)/T/EWA(1)/ETC(m)-6
ACC NR: AT6008849 IJP(c) JD/WW/GS/AT/GH SOURCE CODE: UR/0000/65/000/000/0113/0115

AUTHOR: Yuferov, V. B.; Kovalenko, V. A.; Skibenko, Ye. I.; Busol, F. I.

ORG: none

TITLE: A supersonic hydrogen jet in a vacuum

SOURCE: AN UkrSSR. Magnitnyye lovushki (Magnetic traps). Kiev, Naukova dumka, 1965,
113-115

TOPIC TAGS: supersonic flow, hydrogen plasma, cryogenics, plasma jet, plasma physics,
vacuum

ABSTRACT: Experiments are conducted on the use of cryogenic techniques for generating a supersonic jet of hydrogen on the basis of the successful use of similar techniques in generating supersonic gas jets of CO₂, Ar and N₂. The problem is complex from a technical standpoint since the surface on which the hydrogen condenses must be cooled by liquid helium. Preliminary experiments have shown that a hydrogen jet may be generated under conditions where the thermal load on the cooled surface is 10⁻³-10⁻² w/cm². Thus even when the thermal loads are high, heat transfer between the liquid helium and the wall is sufficient for hydrogen evacuation. It was established that the optimum target thickness for a hydrogen ion energy of 25 kev is reached at a hydrogen flow rate of 45-50 cm³/sec. A curve is given showing the pressure in the charge exchange chamber as a function of the hydrogen flow rate. The pressure for a

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117
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L 24051-66

ACC NR: AT6008849

hydrogen jet is more than an order of magnitude higher than in the case of carbon dioxide and argon jets. Special measurements showed that the reason for this is the considerable temperature drop between the liquid helium and the surface of the condenser. The experimental data show that a supersonic hydrogen jet may be used for charge exchange of intense ion²⁺ beams in installations where a hot plasma is generated by injection of fast neutral hydrogen or deuterium atoms. Orig. art. has: 1 figure.

SUB CODE: 20/ SUBM DATE: 200ct65/ ORIG REF: 005/ OTH REF: 001

Card 2/2 dda

L 47037-66 AMT(1)/AMT(m)/EMP(t)/SPT IJP(c) AT/JD

ACC NR: AP6029801

SOURCE CODE: UR/0089/66/021/002/0130/0131

AUTHOR: Borovik, Ye. S. (deceased); Busol, F. I.; Glasov, B. V.; Kovalenko, V. A.;
Skibenko, Ye. I.; Yuferov, V. B.

10
68

B

ORG: none

TITLE: VGL-2 cryogenic magnetic trap

SOURCE: Atomnaya energiya, v. 21, no. 2, 1966, 130-131

TOPIC TAGS: MAGNETIC TRAP DEVICE, magnetic trap, hydrogen plasma, deuterium, plasma heating, plasma injection, cryogenic liquid cooling/VGL-2 magnetic trap DEVICE

ABSTRACT: Since one of the means of producing a hot plasma is to inject intense beams of fast neutral hydrogen or deuterium atoms into a magnetic field, where they can be ionized, the authors describe the processes accompanying the filling of a small magnetic trap in which a strong magnetic field is produced. (Fig. 1) The trap differs from earlier designs in that the strong magnetic field up to (105 KG) is produced by a copper coil cooled with liquid nitrogen, which is also used to cool the outside of the vacuum chamber and thus permits a vacuum as low as $\sim 5 \times 10^{-10}$ Torr to be maintained in it. An Ardenne type source is used for the hydrogen-ion beam, the charge exchange being in a supersonic CO_2 stream condensed on a surface cooled to 20.4K. The fraction of the neutral beam ionized in the wording region of the chamber

UDC: 533.9

Card 1/3

L 47057-66

ACC NR: AP6029801

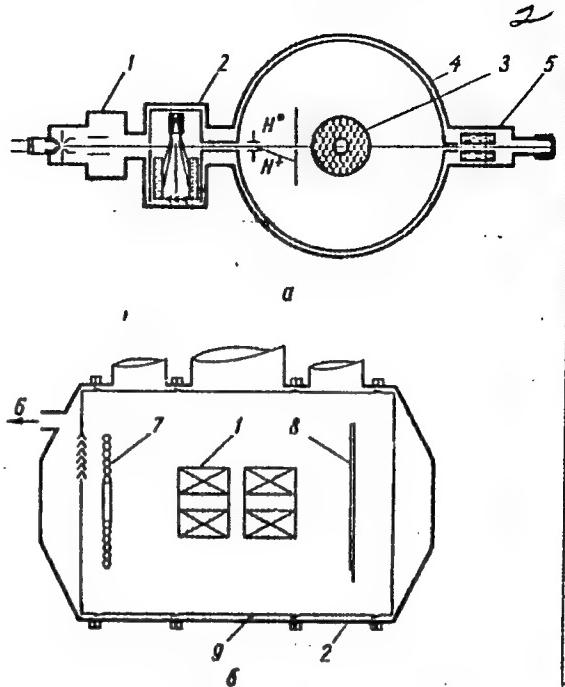


Fig. 1. Diagram of VGL-2 trap. a - section along beam axis, b - along field axis; 1 - ion source, 2 - charge exchange chamber, 3 - magnetic system, 4 - vacuum jacket, 5 - beam inlet, 6 - to pump, 7 - helium condensation pump, 8 - hydrogen pump, 9 - nitrogen screen

Card 2/3

ACC NR: AP6029801

was of the order of 5×10^{-5} . The plasma density was determined from the intensity of flux of fast atoms leaving the plasma as a result of charge exchange between the ions and the residual gas, and also from the value of the injected current in the trap. The values obtained were $\sim (3-4) \times 10^7$ and $\sim 3 \times 10^8 \text{ cm}^{-3}$, respectively, the difference being due to a small redistribution of the ion velocities in the plasma.
Orig. art. has: 2 figures and 2 formulas [02]

SUB CODE: 20/ SUBM DATE: 01Apr66/ ORIG REF: 003/ OTH REF: 003 / ATD PRESS:
5089

ms
Card 3/3

ACC NR: AP 7001308

SOURCE CODE: UR/0057/66/036/012/2154/2160

AUTHOR: Busol, F.I.; Skibenko, Ye.I.; Yuferov, V.B.

ORG: none

TITLE: Influence of nozzle configuration on supersonic flow of gas into vacuum

SOURCE: Zhurnal tekhnicheskij fiziki, v. 36, no. 12, 1966, 2154-2160

TOPIC TAGS: Laval nozzle, supersonic nozzle, gas jet, carbon dioxide, vacuum

ABSTRACT: The authors have investigated the spread of supersonic jets of CO₂ issuing from different Laval nozzles into vacuum. The investigations were undertaken in connection with design of gaseous charge exchange targets. The investigated nozzles had throat diameters T from 0.3 to 3.0 mm, mouth diameters M up to 15 mm, lengths L (from throat to mouth) from 0 to 81 mm, and values of L/M from 0 to nearly 6. The pressure was measured at a point 15 cm from the axis of the jet, and the increase of this pressure in the presence of the jet was taken as a measure of the spread. In addition to the nozzle dimensions, there was investigated the effect of metal shielding tubes of different lengths surrounding the initial portion of the jet and cooled to 20.4° K. Most of the measurements were made at a standard flow rate of 11 cm³/sec. The experimental technique has been described in more detail elsewhere by the authors and collaborators (ZhTF, 34, No.12, 1964; 35, No.8, 1965). Small

Card 1/2

UDC: 533.17

ACC NR: AP 7001309

values of T (requiring high pressures behind the nozzle to achieve the standard flow rate) were found to favor sharpness of the jet, and the optimum value of L/M was in the neighborhood of unity, depending somewhat on T. The cold shielding tubes considerably improved the jet sharpness. For an approximately optimal nozzle with T = 0.3 mm and L/M = 1 the pressure at 15 cm from the axis (presumably with the standard flow rate of 11 cm³/sec) was approximately 2×10^{-5} , 7×10^{-7} , and 1×10^{-7} mm Hg when the length of the shielding tube was 0, 1.3, and 8 mm, respectively. Experiments at different flow rates showed that for nozzles with T = 1.5 mm and L/M between 0.5 and 5.0 the pressure at 15 cm from the axis was practically independent of the flow rate for rates from 10 to 95 cm³/sec. The authors thank Ye.S.Borovik for advice and discussions, and M.M. Nikulin for fabricating the nozzles. Orig. art. has: 5 figures and 1 table.

SUB CODE: 20 SUBM DATE: 20Dec65 ORIG. REF# 007

Card 2/2

SKIBICKI, WA LNW.

Slownik techniczny rosyjsko-polski.

Warszawa, Państwowe Wydawn. Techniczne, 1951. 450 p.

Bibliography: p. (7)

Russian-Polish technical dictionary.

DLC: T9.S6

SO: Manufacturing and Mechanical Engineering in the Soviet Union, Library
of Congress, 1953.

SKIBICKI, LAW

Slownik techniczny angielskopolski. Wyd. 2. przerob. i rozzw. Warszawa,
Panstwowe Wydawn. Techniczne, 1952. 672 p. (English-Polish technical dictionary. bibl.)

SO: Monthly List of East European Accessions, Library of Congress, Vol. 3, No. 6, June.
1954, Incl.

MAYZUS, Z.K.; SKIBIDA, I.B.; EMANUEL', N.M.

Particular features of the kinetics of n-decane oxidation in
open systems. Kin.i kat. 2 no.4:538-546 Jl-Ag '61.
(MIRA 14:10)

1. Institut khimicheskoy fiziki AN SSSR.
(Decane) (Oxidation)

5(4)
AUTHORS:

Denisov, Ye. T., Mayzus, Z. K.,
Skibida, I. P., Emanuel', N. M., Corresponding Member, AS USSR
SOV/20-128-4-33/65

TITLE:

Kinetic Laws for Autocatalytic Reactions in Open Systems

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 128, Nr 4,
pp 755-758 (USSR)

ABSTRACT:

In chemical technology, the continuous process of reactions is attempted more and more, i.e. of reactions in open systems. While the kinetics of simple processes had already been investigated (Refs 2-4), no data are available on autocatalytic processes. Therefore, the continuous oxidation of cyclohexanone to adipic acid by oxygen at 130° was studied. The apparatus used permitted the automatic maintenance of the inflow of raw material and of the outflow of the reaction products. The term of "specific velocity" v is defined as the volume of the liquid initial component supplied to the unit of volume of the reaction vessel in the unit of time. The value $\frac{1}{v}$ indicates the average duration of stay of the liquid in the reaction vessel. The content of hydrogen peroxide, adipic acid, and CO₂ in the reaction product is

Card 1/3

Kinetic Laws for Autocatalytic Reactions in
Open Systems

SOV/20-128-4-33/65

determined for different v . In the continuous process, a stationary state appears, i.e. the reaction rate and the discharge of the end product are in an equilibrium relation to each other. Figure 1 shows the dependence of the equilibrium concentration of adipic acid on v . In the transition from the periodic process to the continuous one, it is of no importance in which phase of reaction this transition takes place since the equilibrium concentration is formed corresponding to v , irrespective of the oxidation degree attained. While for simple reactions the rate rises monotonously with v , there is a different dependence for autocatalytic reactions since not only the concentration of the initial product but also that of the resulting intermediate product (hydrogen peroxide) is decisive. Figure 3 shows that the reaction rate passes a maximum at a certain v ; if v keeps on rising, the reaction rate falls since the concentration of the hydrogen peroxide becomes lower. The equation for the maximum reaction rate is written down. It is pointed out that in the continuous process, in comparison with the periodic process, a smaller amount of burning to CO_2 and H_2O

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Kinetic Laws for Autocatalytic Reactions in
Open Systems

SOV/20-128-4-33/65

occurs because the reaction products remain in the reaction zone for a shorter period. There are 3 figures and 6 references, 3 of which are Soviet.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics of the Academy of Sciences, USSR)

SUBMITTED: June 22, 1959

Card 3/3

82654

S/195/60/C01/C01/C03/C07
B015/B06C

5.3200

AUTHORS: Mayzus, Z. K., Skibida, I. P., Emanuel' N. M.
Yakovleva, V. N.

TITLE: Chain- and Molecular Reactions of Intermediates in the
Oxidation of n-Decane |

PERIODICAL: Kinetika i kataliz, 1960, Vol. 1, No. 1, pp 55-62

TEXT: The authors studied the decomposition kinetics of the hydroperoxides of n-decyl in n-decane in the presence of α -naphthene acting as an inhibitor. The latter was added at various stages of the reaction. The constant of hydroperoxide decomposition without chain reaction was calculated from the kinetic curves and was found to equal $1.7 \times 1.0 \cdot 10^{-3} \text{ min.}^{-1}$. It is near the value of the reaction rate constant of the reaction chain branching in the oxidation of n-decane ($K = 1.1 \cdot 10^{-3} \text{ min.}^{-1}$). From this the authors concluded that, besides the decomposition of the hydroperoxide molecules into radicals without chain reaction, there also takes place a molecular decomposition under the formation of ketones and water. α -naphthene was found to react not only

Card 1/3

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Chain- and Molecular Reactions of Intermediates S/195/6C/C01/C01/C03/C07
in the Oxidation of n-Decane B015/B060

with the RC_2^{\cdot} radical but also with RO^{\cdot} radicals developing in the hydroperoxide decomposition. The formation of free radicals with the chain branching occurs in parallel to two reactions: the monomolecular decomposition of the hydroperoxide $\text{RCOOH} \rightarrow \text{RO} + \text{OH}$ and the reaction of the hydroperoxide with the hydrocarbon $\text{ROOH} + \text{RH} \rightarrow \text{RO} + \text{H}_2\text{O}$. The authors established the effective reaction rate constant of the chain branching reaction in the oxidation of n-decane as the sum of the constants of the monomolecular decomposition of the hydroperoxide (in chlorobenzene as an inert solvent) and of the bimolecular reaction of the hydroperoxide with n-decane. The reaction rate constant of the bimolecular branching reaction rises with the weakening of the C-H bond in the hydrocarbon in the following order: decane < isodecane < ethyl benzene < methyl oleate. In the oxidation of n-decane, the alcohols were found to be formed by a chain reaction and (partly) a molecular reaction, while they are used up only by a chain reaction. The ketones are formed by a chain reaction, and are likewise used up by a chain reaction. N. N. Semenov is mentioned in the text. There are 6 figures and 7 references: 5 Soviet, 1 US, and 1 British.

Card 2/3

X

Chain- and Molecular Reactions of Intermediates
in the Oxidation of n-Decane

S/195/60/001/001/003/007
B015/R060

02024

ASSOCIATION: Institut chimiticheskoy fiziki Akademii nauk SSSR (Institute
of Chemical Physics of the Academy of Sciences USSR)

SUBMITTED: January 4, 1960

W

Card 3/3

5.3300

AUTHORS:

Mayzus, Z. K., Skibida, I. P.,
Emanuel', N. M., Corresponding Member
AS USSR

69511

S/020/60/131/04/045/073
B004/B125

TITLE:

The Mechanism of Chain Branching in the Reaction of the Oxidation
of n-Decane 1

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol 131, Nr 4, pp 880 - 882 (USSR)

TEXT: The authors discuss the reaction equations $\text{ROOH} \rightarrow \text{RO}^\bullet + \text{OH}^\bullet$ (1),
 $2\text{ROOH} \rightarrow \text{RO}_2^\bullet + \text{H}_2\text{O}$ (2), and $\text{ROOH} + \text{RH} \rightarrow \text{R}^\bullet + \text{RO}^\bullet + \text{H}_2\text{O}$ (3) in view of
their energetic probability. Their experimental investigations are based on the
fact that the equations (1) and (3) differ from each other by the effective par-
ticipation of the hydrocarbon in equation (3). If equation (3) is valid, then a
dependence of the decomposition of the ROOH compounds (hydrogen peroxides) on the
concentration of the hydrocarbon should be observable. They measured the rate of
the branching of the reaction in solutions of n-decyl hydrogen peroxide in
chlorobenzene and in mixtures of chlorobenzene and n-decane. The hydrogen per-
oxides were obtained by oxidation of the n-decane, converted into sodium salts,
and extracted from the liquid phase by means of chlorobenzene. The rate of the
reaction was determined according to reference 2 on the basis of the consumption

Card 1/3

69511

S/020/60/131/04/045/073
B004/B125The Mechanism of Chain Branching in the Reaction
of the Oxidation of n-Decane

of the α -naphthol used as an inhibitor. The authors describe the measurement of the concentration of the α -naphthol: double extraction by means of 1 N NaOH, reaction with phenyldiazonium and measuring the intensity of the coloration of the resulting azo-compound by means of an SF-4 spectrophotometer at 520 μm . They attained the result that the hydrogen peroxides also decompose in pure chlorobenzene and, to be sure, according to equation (1). In the presence of n-decane the rate of decomposition corresponding to equation (3) increases linearly with the increasing concentration of the n-decane (Fig 1). The reaction thus takes place simultaneously monomolecularly as well as bimolecularly. For the monomolecular reaction (1) the rate constant k_1 (in pure chlorobenzene) was found equal to $0.28 \cdot 10^{-5} \text{ sec}^{-1}$. The constant k_2 of the bimolecular reaction was determined from the inclination of the line (Fig 1) to equal $1.65 \cdot 10^{-6} \text{ mol}^{-1} \cdot \text{sec}^{-1} \cdot \text{l}$. The authors show the agreement of the effective constant $k_{\text{eff}} = k_1 + k_2 [\text{RH}]$ found in reference 2 with these values. The dependence of the reaction constant k_2 on the type of solvent was further studied in solutions of iso-decane, ethyl benzene and methyl oleate in chlorobenzene. The experimental results are likewise graphically

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69511

The Mechanism of Chain Branching in the Reaction
of the Oxidation of n-Decane

S/020/60/131/04/045/073
B004/B125

represented in figure 1. The values for k_2 show that the reaction rate increases in the same sense as the oxidizability of the hydrocarbon; that is, it increases with the decreasing stability of the C-H bond of the hydrocarbon. The authors mention a paper by N. N. Semenov (Ref 4). There are 1 figure and 6 references, 4 of which are Soviet.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of
Chemical Physics of the Academy of Sciences, USSR)

SUBMITTED: January 3, 1960

X

Card 3/3

8/196/61/002/004/006/cat
E111/E585

AUTHORS: Mazyus, V.V., Skibida, I.P., and Emmanuel, N.M.
TITLE: peculiarities of the kinetics of the oxidation of n-decane
in open systems

PUBLICATION: Kinetika i kataliz, v.2, no.4, 1961, 533-546

TEXT: the authors point out that most published information on chemical kinetics relates to closed systems, i.e., those without mass exchange with the surroundings. They have previously studied, together with Yu. P. Denisov (Ref.7; Dokl. AN SSSR, 128, 755, 1959), an autocatalytic reaction in an open system. For the present work they selected the oxidation of n-decane, which is interesting as a multi-centered reaction giving a comparatively large number of intermediate products. The oxidation was carried out at 140°C in the apparatus shown in Fig. 1 (1 - syringe for adding reactants, 2 - tube to maintain a constant level for the reacting mixture, 3 - stopcock for sampling). The decane was poured into the vessel and oxidized in a closed system to a certain degree; thereafter, more decane was added at a constant rate, the volume of liquid in the vessel being kept constant by continuous removal through tube 2.

End 1/p/

coefficients of the kinetics are:

$\beta_1 = 0.767 \text{ mole/liter}^{-1} \text{ sec}^{-1}$
 $\beta_2 = 1.11 \text{ liter/mole sec}$

(Fig. 1). The rate of diene addition v was taken as the ratio of the volume of liquid added per hour to that of the liquid in the vessel. This was varied from 0.0625 to 1.93 "hour". Samples, taken periodically, were analyzed for hydroperoxides, alcohols, ketones and acids. For a given temperature and addition rate, there can be only one stationary state. Fig. 1 shows concentrations of α -ketones, β -ketones and β -acids, respectively, as functions of time. From the corresponding curves of α , the numbers on the curves correspond to the following values of v : 1 - $v = 0.935 \text{ liter/sec}$; 2 - $v = 0.125$; 3 - $v = 1.76$; 4 - $v = 0.0935$. The author has also plotted the relations between these curves and the curves of the relative concentrations of acids (C_b) and hydroperoxides (C_h) as functions of time (Fig. 2), respectively. Fig. 2; ordinary, and logarithmic, "inches start" and "inches end" scales are used. The starting value reported from their concentrations of acids (C_b) is 1.0. It is sometimes that these effects may occur, the author has

Fig. 2
Interrelation of the relative values of α , β -ketones and β -acids, and the relative concentrations of acids (C_b) and hydroperoxides (C_h)

Peculiarities of the kinetics ...

S/195/61/002/004/006/008
E111/E585

respectively, their stationary concentration by \bar{x} and \bar{y} and their initial concentrations by x_0 and y_0 , the authors show that a "false start" effect can occur at values of $v < \frac{k_1 \Delta x_0}{\Delta y_0} - k_2$

with $\Delta x_0 > 0$ and $\Delta y_0 > 0$ or $\Delta x_0 < 0$ and $\Delta y_0 < 0$.

Here $\Delta x_0 = x_0 - \bar{x}$ and $\Delta y_0 = y_0 - \bar{y}$. "Overshoot" can occur at all the values of v if $\Delta x_0 > 0, \Delta y_0 < 0$ or $\Delta x_0 < 0$ and $\Delta y_0 > 0$.

The sign of the differential $(d\Delta y/dt)_{t=t_0}$ is determined only by

the sign of Δx_0 . Fig.6 shows the rules of accumulation of hydroperoxides and acids (curves 1, 2, respectively, left-hand ordinate) and of ketones and acids (curves 3, 4, respectively, right-hand ordinate) as functions of v (hours⁻¹). These curves show that by changing v the relative yields of the components can be changed. In general the maximum rate of accumulation of component c in

$A \xrightarrow{k_1} B \xrightarrow{k_2} C \xrightarrow{k_3} D$ occurs at greater values of v than if the

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Peculiarities of the kinetics ...

5/195/61/002/004/006/008

E111/E585

last stage were absent. Furthermore, except when $k_3 \gg k_2$, the maximum rate of accumulation of each successive product is attained at values of v less than that corresponding to the maximum rate of accumulation of the preceding product. The conclusion can be drawn that acids are not formed in n-decane oxidation from ketones and alcohols. In an open system the alcohols, ketones and acids are formed directly from hydroperoxides, but for a closed system L. S. Vartanyan, together with the present authors Z. K. Mayzus and N. M. Emanuel', have shown (Ref.8: Zh.fiz.khimii, 30, 862, 1956) that the acids are formed from hydroperoxides via an intermediate stage of ketone formation. There are 6 figures and 11 references: 9 Soviet-bloc and 2 non-Soviet-bloc. The English-language references read as follows: Ref.4: K. G. Denbigh, M. Hicks, F. M. Page, Trans.Faraday Soc., 44, 479, 1948; Ref.10: L.J.Durham, J. S. Mooser, J.Amer.Chem.Soc., 80, 327, 1958.

ASSOCIATION - Institut khimicheskoy fiziki AN SSSR
(Institute of Chemical Physics AS USSR)

SUBMITTED February 7, 1961
Card 4/6

SKIBIDA, I.P.; MAYZUS, Z.K.; EMANUEL', N.M.

Study of kinetic regularities of complex chain processes as a method for determining the rates of formation and consumption of intermediate products. Dokl.AN SSSR 144 no.1:170-172
My '62. (MIRA 15:5)

1. Institut khimicheskoy fiziki AN SSSR. 2. Chlen-korrespondent AN SSSR (for Emanuel').
(Hydrocarbons) (Chemical reaction, Rate of) (Oxidation)

EMANUEL', N.M.; KNORRE, A.G.; Prinimali uchastiye: GAGARINA, A.B.;
SKIBIDA, I.P.; ALAVERDOV, Ya.G., red.; YEZHOOVA, L.L., tekhn.
red.

[Course in chemical kinetics; homogeneous reactions] Kurs khimicheskoi kinetiki; gomogennye reaktsii. Moskva, Gos.izd-vo "Vysshiaia shkola," 1962. 413 p. (MIRA 16:3)
(Chemical reaction, Rate of)

8/020/63/148/006/021/023
B190/B102

AUTHORS: Skibida, I. P., Kulitskiy, Z. I., Mayzus, Z. K.

TITLE: Reactivity of isomeric decanols, the intermediates of n-decane oxidation

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 148, no. 6, 1963, 1358-1360

TEXT: The reactivity of decanols with hydroperoxides was determined from their consumption when added to the reaction mixture. The pure initial product n-decane was added to the reaction mixture at a certain rate until a stationary concentration C_1 of the intermediate (alcohol) set in.

A mixture of decane and 0.205 mole/l of decanol-2 was added at the same rate, whereupon a higher stationary concentration C_2 of the intermediate became established. If, instead of this mixture, mixtures of decanol-4 and subsequently of decanol-5 having the same concentration were added, then the stationary concentration C_2 remained constant. The hydroperoxide concentration also remained constant during the experiments. Hence it

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S/020/63/148/006/021/023
B190/B102

Reactivity of isomeric decanols, ...

follows that the decanols used exert no effect on the radial concentration in the system and have the same reactivity. The gross velocity of the formation of the alcohols in n-decane oxidation was found to be

$$v_{gr} = 7.4 \cdot 10^{-4} \text{ mole/l min.}$$

There is 1 figure.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics of the Academy of Sciences USSR)

PRESENTED: July 28, 1962, by V. N. Kondratyev, Academician

SUBMITTED: July 23, 1962

Card 2/2

SKIBIDA, I.P.; MAYZUS, Z.K.; EMANUEL', N.M.

Activation energy of the chain reactions by which
alcohols are formed and consumed in the oxidation of
n-decane. Dokl. AN SSSR 149 no.5:1111-1114 Ap '63. (MIRA 16:5)

1. Institut khimicheskoy fiziki AN SSSR. 2. Chlen-korrespondent
AN SSSR (for Emanuel').
(Decane) (Alcohols) (Chemical reaction, Rate of)

EMANUEL', N.M.; DRONOVA, L.M.; KONOVALOVA, N.P.; MAYZUS, Z.K.;
SKIBIDA, I.P.

Antileukemic effect of 2,6-di-tert.-butyl-4-methylphenol
(ionol). Dokl. AN SSSR 152 no.2:481-484 S '63. (MIRA 16:11)

*

ACCESSION NR: AP4024407

S/0204/64/004/001/0082/0090

AUTHOR: Skibida, I. P.; Mayzus, Z. K.; Emanuel', N. M.

TITLE: Reactivity of intermediate materials in hydrocarbon oxidation reactions.

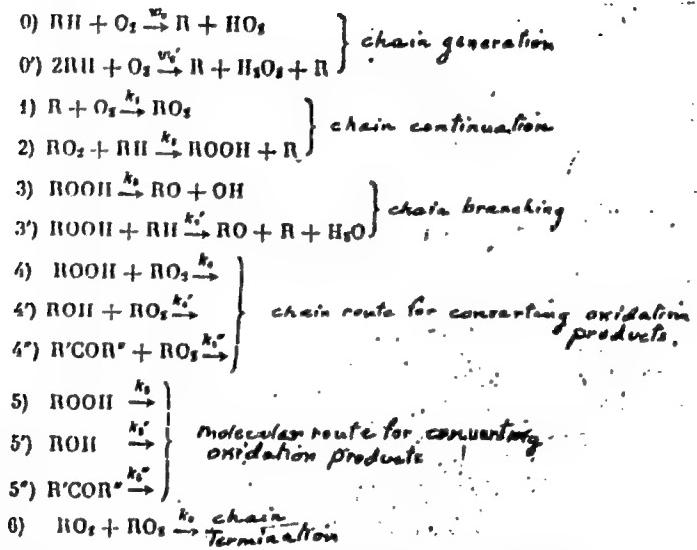
SOURCE: Neftekhimiya, v. 4, no. 1, 1964, 82-90

TOPIC TAGS: hydrocarbon oxidation, reaction rate, hydroperoxide, alcohol, ketone, RO₂ radical, ethylbenzene oxidation, decane oxidation, kinetics, acetophenone, methylphenylcarbinol, reactivity

ABSTRACT: The rates of reaction of hydroperoxides, alcohols and ketones with RO₂ radicals in the oxidation of ethylbenzene and n-decane were determined by a method developed by the authors (Uspekhi khimii 26, 416, 1957) wherein the rates of formation and consumption of reaction products in an open system may be determined. The various parallel and consecutive reactions by which the chain oxidation of hydrocarbons may proceed were investigated and the reaction rates determined.

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ACCESSION NR: AP4024407



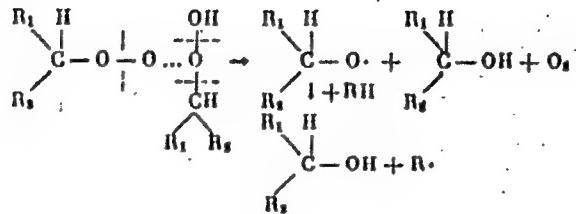
Card 2/8

ACCESSION NR: 4024407

The kinetic curves of ethylbenzene consumption and hydroperoxide accumulation (fig. 1) and alcohol (methylphenylcarbinol), hydroperoxide and ketone (acetophenone) accumulations (figs. 2 and 3) for reactions run at 118°C were drawn. Acetophenone is the end product of ethylbenzene oxidation; its rate of consumption $k_4''(RO_2) = 0$, $k_5 = 0$, and $k_3 = 0.82 \times 10^{-3}$ mol/l.hr. The reactivity of ethylbenzene and its oxidation products with RO_2 increases in the series ethylbenzene ($k_2 = 8.3 \times 10^{-3}$ hrs $^{-1}$), alpha-hydroperoxide ($k_4 = 7.8 \times 10^{-2}$ hrs $^{-1}$), and methylphenylcarbinol ($k_4' = 10.2 \times 10^{-2}$); the relative reactivities are 1:9.5:12. $k_6 = 7.8 \times 10^{10}$ l/mol.hr. The rate constants of the elementary reactions were determined: $k_2 = 1.3 \times 10^1$, $k_4 = 1.2 \times 10^2$ and $k_4' = 1.6 \times 10^2$ l/mol.sec. The reactivity of n-decane, its hydroperoxide and its isomeric alcohols formed by oxidation at 140°C was determined (fig. 4). The rate of reaction with RO_2 radicals for all the isomers is the same. $k_2(RO_2) = 3.8 \times 10^{-4}$ min $^{-1}$; $k_4(RO_2) = 2.6 \times 10^{-3}$; $k_4'(RO_2) = 0.51 \times 10^{-2}$; hence the rate of reaction of RO_2 increases in the order n-decene, alcohols, hydroperoxide in the ratio of 1:6.3:13. As with ethylbenzene, the reactivity of n-decane with the RO_2 radical is less than with their respective hydroperoxides or alcohols. Unlike ethylbenzene, the reactivity with the decyl alcohols is two times less than with the hydroperoxide, leading to the formation of different products, in this case alcohols:

Card 3/8

ACCESSION NR: AP4024407



Orig. art. has: 21 equations and 6 figures.

ASSOCIATION: Institut khimicheskoy fiziki, AN SSSR (Institute of Chemical Physics, AN SSSR)

SUBMITTED: 26Ju163

DATE ACQ: 17Apr64

ENCL: 04

SUB CODE: GC

NO REF Sov: 007

OTHER: 001

Card 4/8

ACCESSION NR.: AP4024407

ENCLOSURE: 01

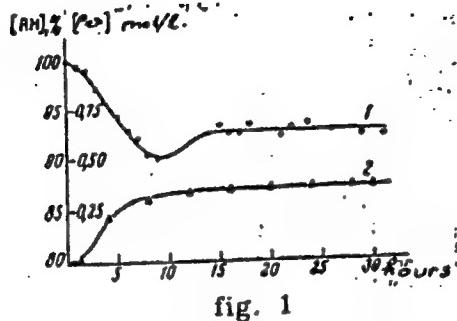


fig. 1

Kinetic curves of the consumption of hydrocarbon (curve 1, external scale) and accumulation of hydroperoxide (curve 2, internal scale). Ethylbenzene oxidized in open system $v/V = 0.102 \text{ hr}^{-1}$, 118° .

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ACCESSION NR: AP4024407

ENCLOSURE: 02.

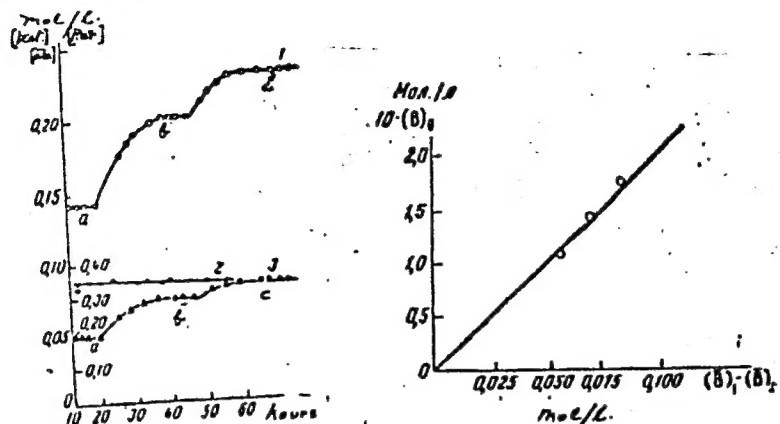


fig. 2

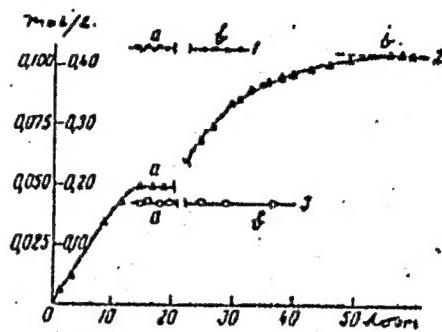
Kinetic curves for the accumulation of alcohol (1), hydroperoxide (2) and ketone (3). Ethylbenzene oxidation in open system with ethylbenzene feed (part a) and feed of methylphenylcarbinol solution in ethylbenzene, containing 0.106 mol/l alcohol (part b) and 0.17 mol/l. alcohol (part c). $v/V = 0.102 \text{ hr}^{-1}$, 118° .

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ACCESSION NR: AP4024407

ENCLOSURE: 03

Fig. 3. Kinetic curves for the accumulation of hydroperoxide, ketone and alcohol. Oxidation of ethylbenzene in open system with ethylbenzene feed (curves 1a, 2a, 3a) and feed of ethylbenzene containing 0.055 mol/l. acetophenone (curves 1b, 2b, 3b), 1--hydroperoxide (internal scale); 2--acetophenone; 3--methylphenylcarbinol. v/v \approx 0.102 hr $^{-1}$.

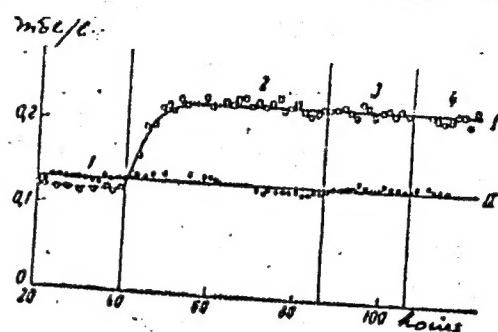


Card 7/8

ACCESSION NR: AP4024407

Fig. 4. Stationary concentration of alcohols (I) and hydroperoxide (II) in oxidizing n-decane in open system; $v/V \approx 2.7 \times 10^{-3} \text{ min}^{-1}$, 140° . Section 1--pure n-decane feed; 2--mixture of n-decane with decanol-2; in amount of 0.205 mol/l.; 3--mixture of n-decane with the same amount of decanol-4; 4--mixture of n-decane with decanol-5.

ENCLOSURE: 04



Card 8/3

ACCESSION NR: AP4019007

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TITLE: Sequence of products formed by oxidizing ethylbenzene

SOURCE: AN SSSR. Izv. Seriya khimicheskaya, no. 2, 1964, 286-293

TOPIC TAGS: ethylbenzene, ethylbenzene oxidation, ethylbenzene alpha-hydroperoxide, methylphenylcarbinol, acetophenone, kinetics

ABSTRACT: It was established that the succession of interreactions of the original and intermediate materials in initiated ethylbenzene oxidation is the formation of the ethylbenzene alpha-hydroperoxide, its decomposition to form the methylphenylcarbinol, and finally the oxidation of the latter to acetophenone. The kinetics of each step of the oxidation was studied. It was established that acetophenone is the final oxidation product of the reaction and that it is not itself consumed in the reaction. It is formed directly and exclusively from the alcohol.

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